

Work Order ID 81517

81517

Page 1

May-30-12 7:55:38 AM

Item ID: D350-748-101

Accept

N900040100

Setup Start

NS1

Revision ID: U/R

Stop

NS2

Item Name: Crosstube Installation, High Fwd

Start Date: 3/15/12 Start Qty: 1.00

1

Cust Item ID:

Required Date: 4/04/12 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr								
D350-748-141	F U/R	OK OP 12/12/25	0.00						MC 12/06/25
100									
100	DOCUMENT CONTROL								
DC	Memo	0.00							
Document Control	Photocopy bluefile & type labels per PPPD350-748-101		CHG002						12/06/25

110

110

CNC Bend 1

CNC Delta 100 Bender

BENDING MACHINE - CROSSTUBES

0.00

Memo

0.00

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and
Folio FT _____

12-5-9

120

120

QC

Quality Control

QC15- Crosstube Dimensional Check

0.00

Memo

0.00

Issue P/O to Met Cor P/O: ~~16942~~
Rec'd + inspect attached copy to w/o

CD 12/06/04

P/M/R

Work Order ID 81517

March-15-12 8:42:50 AM

81517

Page 2

Item ID: D350-748-101

Accept

Revision ID: U/R

Item Name: Crosstube Installation, High Fwd

Start Date: 15/03/2012 Start Qty: 1.00 *1*

Required Date: 04/04/2012 Req'd Qty: 1.00 *1*

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

125

125

HandFXtube

Hand Finishing Crosstubes

Memo

0.00

0.00

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp: _____

Start time: _____

Finish time: _____

127

QC6- Inspect dimensions to drawing

0.00

81517

0.00

Memo

QC

Quality Control

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval Q/C Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 81517

March-15-12 8:42:50 AM

81517

Page 3

Item ID: D350-748-101

Accept

N900040100

Setup

Start

NS1

Revision ID: U/R

Item Name: Crosstube Installation, High Fwd

Stop

NS2

Start Date: 15/03/2012 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 04/04/2012 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run

Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

130

130

Crosstubes

Crosstubes

0.00

Memo

0.00

1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B &C Drill Jigs,
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-141

4-Remove all marks from tube within limits of D350-748-141

5- Apply a light coat of LPS3 on the interior of tube

Batch: W148

3
2
1
W
W

12-5-22

12-5-22

140

140

QC

Quality Control

QC5- Inspect part completeness to step on W/O

0.00

Memo

0.00

8.2/05/36

CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval Q/I Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
 Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
		552-51						

NOTE: Date & initial all entries

Work Order ID 81517

March-15-12 8:42:50 AM

81517

Page 4

Item ID: D350-748-101

Accept

N900040100

Setup

Start

NS1

Revision ID: U/R

Item Name: Crosstube Installation, High Fwd

Start Date: 15/03/2012 Start Qty: 1.00 *1*

Required Date: 04/04/2012 Req'd Qty: 1.00 *1*

Cust Item ID:

Customer:

Reference:

Approvals: Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run

Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

150

150

Outsource3

Outsource process - Cad plate

Memo

Issue P/O: 17084

Stress relief at 375° for 5 hours

Magnetic Particle Inspect per ASTM E1444

Cadmium Plate per AMS-QQ-P-416B, Class 1, Type 2

Embrittle relief at 375° for 8 hours, Chromate Treat

Possible Supplier: Southwest United Industries

Ensure Certificate of Conformity is attached

160

160

Packaging

Packaging

Receive & Inspect for Damage & Mat'l Certs

0.00

Memo

Ensure certificate of conformity is attached

170

170

QC

Quality Control

QC5- Inspect part completeness to step on W/O

0.00

Memo

0.00

Surface

ASZ w/o CAG, OVR

12.03.15

REL

OP

W/O: 01517		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
12.03.15	171	LOAD TEST TO 3500 lb FOR 1 MINUTE	AP	12/6/15	1	AP 12.03.15 03/04/15	SO checked
12.03.15	172	NDT P/O: 17258 C 212100119 rec'd <i>PC/12/15</i>				AP 12.03.15 03/04/15	SO relocated

Part No: 0550-7Y8-101 PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

W/O:		WORK ORDER CHANGES							
DATE	STEP	PROCEDURE CHANGE			By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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NOTE: Date & initial all entries

Work Order ID 81517

March-15-12 8:42:50 AM

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Item ID: D350-748-101

Accept

N900040100

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NS1

Revision ID: U/R

Stop

NS2

Item Name: Crosstube Installation, High Fwd

Start Date: 15/03/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 04/04/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

210

QC5- Inspect part completeness to step on W/O

0.00

210

QC

Quality Control

12/06/24

220

Pick Kit

0.00

220

Packaging

Packaging

Memo

0.00

12/06/25

230

QC4- 100% Inspect kits for completeness

0.00

230

QC

Quality Control

Memo

0.00

12/06/25

WORK ORDER CHANGES

W/O:		PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
DATE	STEP						

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 81517

March-15-12 8:42:50 AM

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Page 7

Item ID: D350-748-101

Accept

N900040100

Setup Start

NS1

Revision ID: U/R

Item Name: Crosstube Installation, High Fwd

Stop

NS2

Start Date: 15/03/2012 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 04/04/2012 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

240

240

Packaging

Packaging

0.00

12/06/25

Packaging

Memo

0.00

Identify and pack for shipping as per PPP D350-748-101

Location:

PPP Rev: C

250

250

QC

Quality Control

QC21- Final Inspection - Work Order Release

0.00

MLJ 12/06/25

Memo

0.00

MF
12-06-25

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Picklist Print

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Page 2

Work Order ID: 81517

81517

Parent Item: D350-748-101

D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 15/03/2012

Required Date: 04/04/2012

D2856-400

Manufactured No

200 f 199.5445 1.181 1.243158

**

D2856-400

Abrasion Strip

81875

1,2

As 12-6-22

Location	Loc Qty	Loc Code
ST409	199.5445	
63735	0.6696	
68076	0.3149	
71164	8.46	
79551	190.1	

D3502-1

Manufactured No

200 Each 39.0000 2 2

**

D3502-1

Support

77041

③

As 12-6-22

Location	Loc Qty	Loc Code
ST051	39	
73419	19	
74873	20	

MS21920-20

Purchased No

200 Each 60.0000 2 2

**

MS21920-20

Clamp (per MIL-DTL-8783C)

121067

②

As 12-6-22

Location	Loc Qty	Loc Code
LG050	60	
116799	8	
120475	2	
120676	50	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Picklist Print

March-15-12 8:42:53 AM

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Work Order ID: 81517

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

81517

D350-748-101

Start Date: 15/03/2012

Required Date: 04/04/2012

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

258.0000

1

1

**

MS27039-1-10

Screw

122027

Location Loc Qty Loc Code

GA 100

120449 100

ST291 158

120120 158

AN4-41A

Purchased

No

220

Each

387.0000

8

**

AN4-41A

Bolt

Location Loc Qty Loc Code

ST360 387

115108 3

115705 7

117619 27

118451 50

118838 50

119328 100

120423 150

AN4-6A

Purchased

No

220

Each

1,649.000

16

16

**

AN4-6A

Bolt

Location Loc Qty Loc Code

ST356 1649

119017 1649

16

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Picklist Print

March-15-12 8:42:53 AM

Page 4

Work Order ID: 81517

81517

Parent Item: D350-748-101

D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 15/03/2012

Required Date: 04/04/2012

AN5-32A

Purchased

No

220

Each

256.0000

4

4

**

AN5-32A

Bolt

Location	Loc Qty	Loc Code
ST339	256	
119328	100	
<u>119862</u>	50	4
120423	75	
120717	1	
120910	30	

AN960JD416

NAS1149D0463J Purchased

No

220

Each

14.0000

32

32

**

AN960.JD416

Washer

Location	Loc Qty	Loc Code
ST351	14	
116289	14	

AN960JD516

NAS1149D0563J Purchased

No

220

Each

0.0000

8

8

**

AN960.JD516

Washer

D3500-1

Manufactured

No

220

Each

35.0000

4

4

**

D3500-1

Saddle

Location	Loc Qty	Loc Code
ST424	35	
73406	8	
76000	27	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Picklist Print

March-15-12 8:42:53 AM

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Work Order ID: 81517

81517
D350-748-101

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 15/03/2012

Required Date: 04/04/2012

Start Qty: 1.00

Required Qty: 1.00

D3501-1

Manufactured

No

220

Each

361.0000

16

16

**

B854141

D3501-1

Bushing

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST051	361	
67757	4	
70682	83	
73391	6	
74866	207	
77033	61	

MS21042L4

Purchased

No

220

Each

5,585.000

24

24

**

M12/444

MS21042L4

Nut

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST300	5585	
117441	51	
117601	157	
117885	16	
118451	133	
119017	232	
119075	2996	
121011	2000	

MS21042L5

Purchased

No

220

Each

1,602.000

4

4

**

12/6/2012

MS21042L5

Nut

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST300	1602	
116105	5	
116548	43	
117611	42	
118179	12	
119109	1500	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD

Work Order: 81517

Description: Crosstube High Fwd (AS350/355)

Part Number: D350-748-101

Inspection Dwg: D350-748-141

Rev: F

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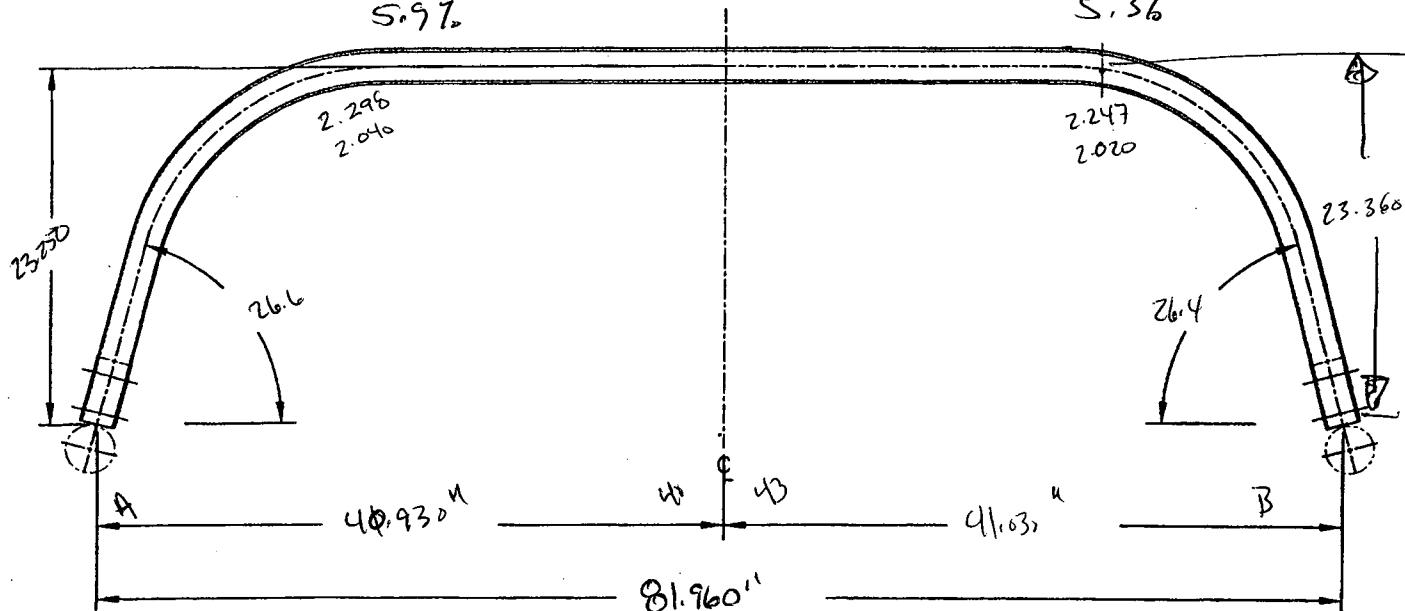
Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04

0.258 ± 4.338

5.97

0.227 ± 4.267

5.37



Comments
Side A = 5.97 crush @ 40 passes
Side B = 5.37 crush @ 43 passes
twist = 0.333
OK OP 12.05.10 Ø31 OPL

QC15 Inspection	8
Date	17/05/10

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	JK

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____
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			Initial Chief Eng	Action Description Chief Eng			

NOTE: Date & initial all entries

DART AEROSPACE LTD

Work Order:

R1514

Description: Crosstube High Fwd (AS350/355)

Part Number:

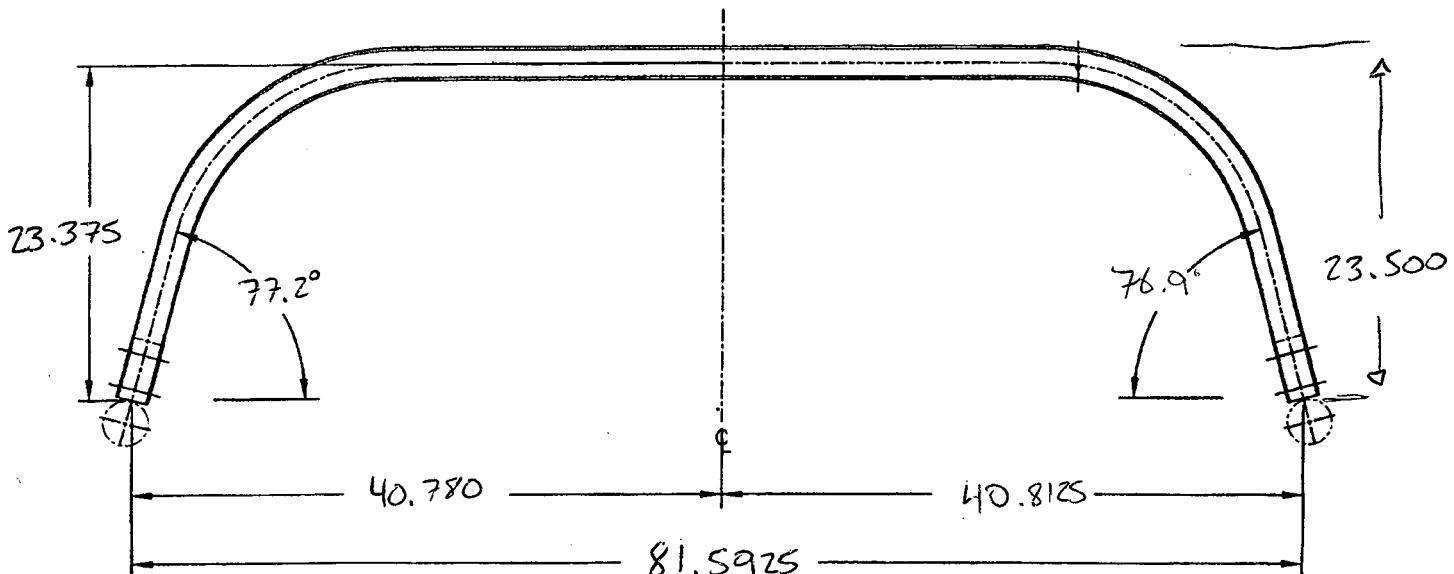
D350-748-101

Inspection Dwg: D350-748-141

Rev: F

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Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04

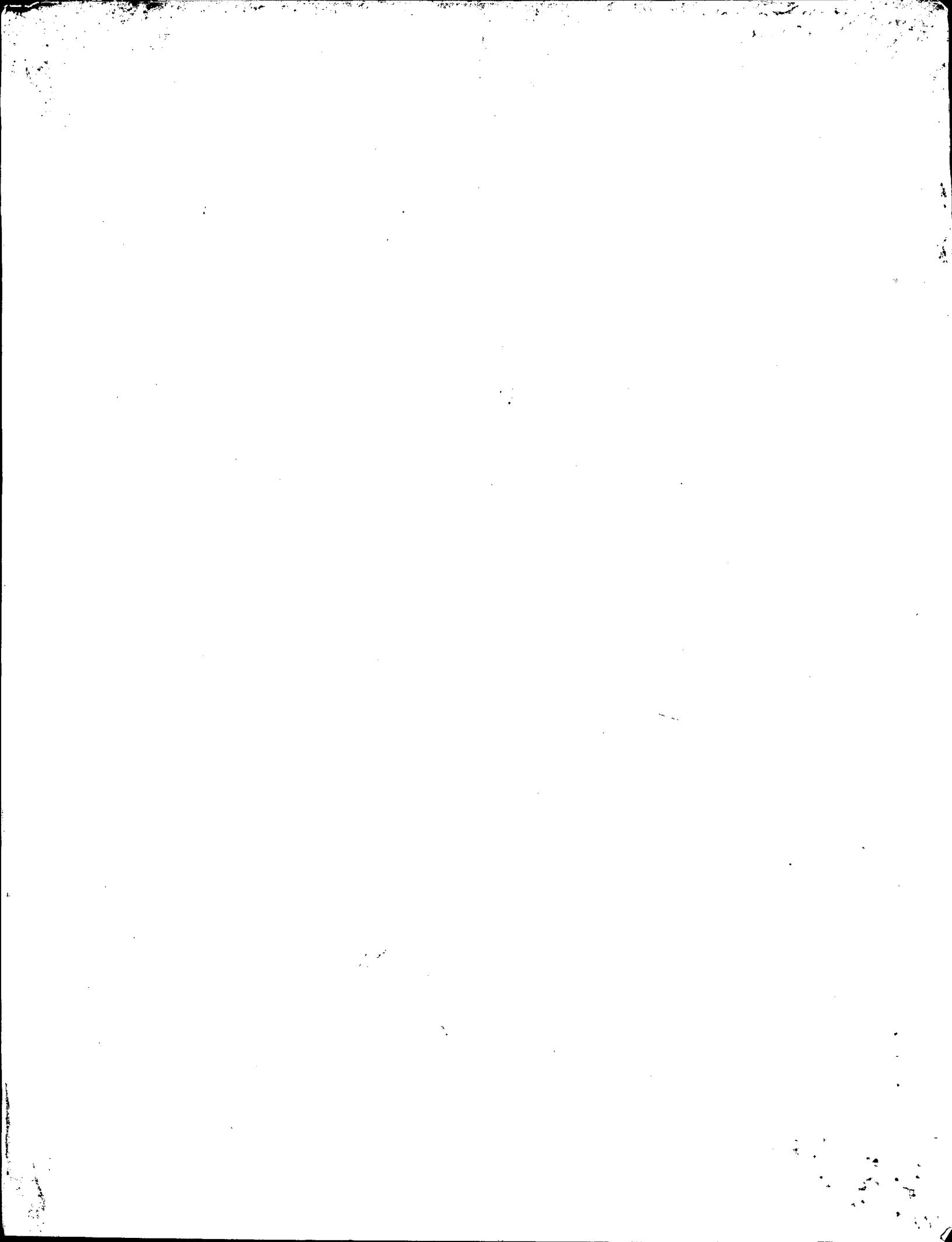


MO 12-5-17

Comments
Twist = 0.025
Acceptable (P12.05.17 P51042)

QC15 Inspection	Date
S	12/05/17

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	AB



Item	Qty	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

SHOP COPY

RETURN TO

ENGINEERING

UNCONTROLLED COPY

SUBJECT TO AMENDMENT

WITHOUT NOTICE

WORK ORDER

NO. 81517 MLJ
12/03/15

GENERAL NOTES:

1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH = 110.270±0.06

2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-CQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2

3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.

4) UNITS: INCHES UNLESS OTHERWISE NOTED.

5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.

6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)

7) WEIGHT: 30.45 lbs

8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.

9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.

10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.

11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.

12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.

13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.

14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

UNDER REVIEW

11/07/12

RELEASED
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATING	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	99	DART AEROSPACE LTD	
DRAWN	99	HAWKESBURY, ONTARIO, CANADA	
CHECKED	1	DRAWING NO.	REV. F
MFG. APPR.	12	D350-748-141	SHEET 1 OF 4
APPROVED	11	TITLE	SCALE
DE APPR.	11	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

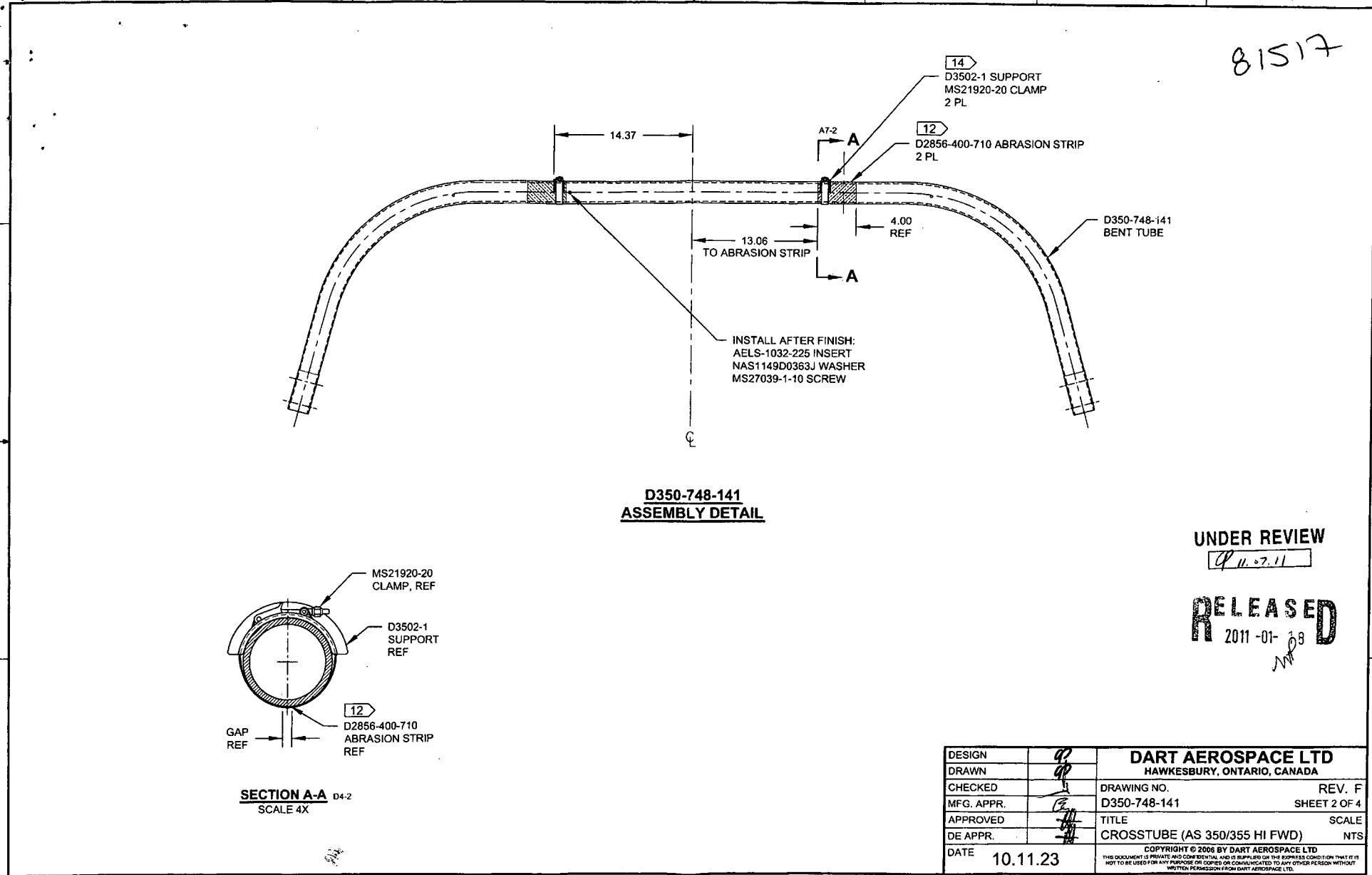
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
		4709P COFA RETURN TO EMERGING TO KILLED COFA AMENDMENT NOTICE REASON					
		...					

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



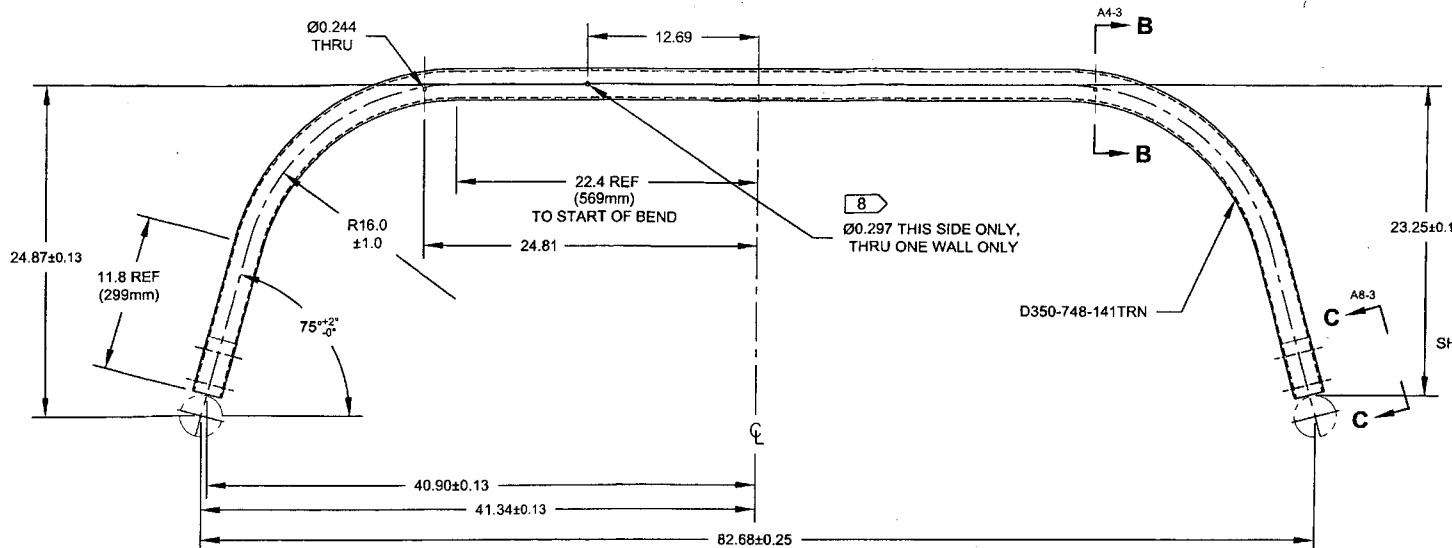
W/O: <i>1120</i>		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

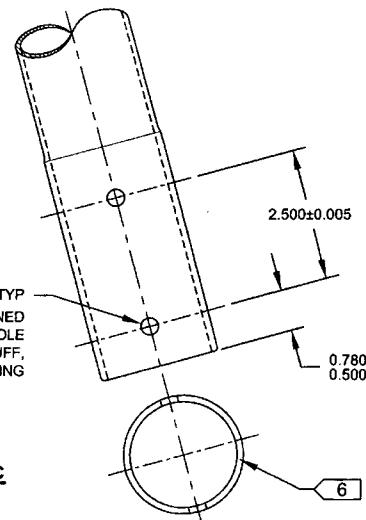
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



81517

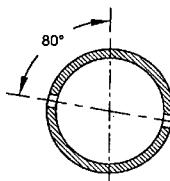
D350-748-141
BENDING AND DRILLING DETAIL 10



Ø0.323^{+0.005}_{-0.000} THRU, TYPE
HOLE TO BE ALIGNED
WITHIN ± 0.001 OF HOLE
ON OTHER SIDE OF CUFF,
TO BE DRILLED AFTER BENDING

C2-3 **VIEW C-C**

SECTION B-B D3-
SCALE 4X



DESIGN	99	DART AEROSPACE LTD	
DRAWN	99	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	Cg		D350-748-141
APPROVED	11	TITLE	SCALE
DE APPR.	11		CROSSTUBE (AS 350/355 HI FWD)
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD	
THIS DOCUMENT IS THE PROPERTY OF DART AEROSPACE LTD. IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT			

UNDER REVIEW

RELEASED
2011-01-18

CROSS TUBE (AS 350/355 HI FWD) NIS

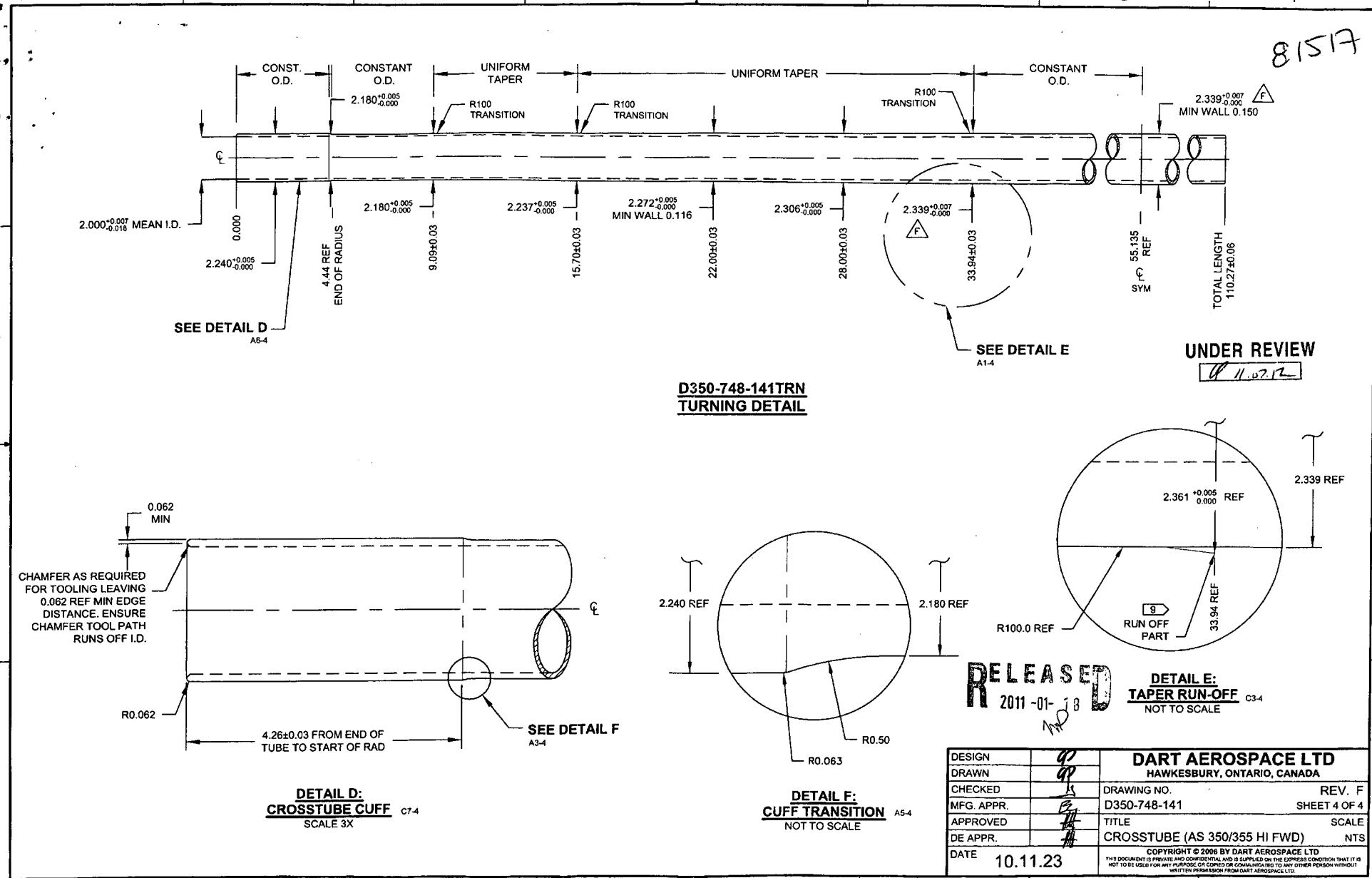
W/O: 12/1		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



W/O: <input checked="" type="checkbox"/> <input type="checkbox"/>		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

METCOR INC.
 560 BOUL. ARTHUR-SAUVÉ
 ST-EUSTACHE, QC, J7R 5A8
 Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détailé

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175881	1

CLIENT / customer 215

DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

1

ON K6A 1K7

COMMANDÉ DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
16942		Steel		

SPÉCIFICATIONS DU PROCÉDÉ
 processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results

Visual

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
7	210	<p>D350-748-101 (1) CROSSTUBE</p> <p>(1) D350-748-101 CROSSTUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>(1) D350-748-201 CROSS TUBE</p> <p>CONTENANT: 1 PALETTE</p>

Operation	Temp. spécifiée Specified Temp	Temps de trempe Spécifié Specified Soak Temp	Atmosphère	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
1,00 CONT. INIT.	LAVAGE		si nécessaire							

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DART AEROSPACE
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 HAWKESBURY

1

ON K6A 1K7

Operation	Temp. spécifiée Specified Temp	Temps de trempe Spécifié Specified Soak Temp	Atmosphere	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
2,00 PREPARING	COMPTAGE									
3,00 STRESS RE	650	2 hrs 30 minutes	air			701				
4,00 FINAL INSP							05-11-2012			05-11-2012

COMMENTAIRES / comments

ALL THE HEAT TREATMENT PROCESSING PERFORMED ON THIS ORDER WAS ACCOMPLISHED USING HEAT TREATMENT EQUIPMENT THAT MEETS THE REQUIREMENTS OF AMS 2759. ALL THE HEAT TREATMENT OPERATIONS WERE ACCOMPLISHED IN ACCORDANCE WITH THE REQUESTED/REQUIRED HEAT TREATMENT SPECIFICATION AND ALL REQUIRED VERIFICATIONS TEST HAVE BEEN PERFORMED AND DOCUMENTED. NO UNAUTHORIZED CHANGES OR DEVIATIONS TO REQUIRED HEAT TREATMENT SPECIFICATIONS OR PROCEDURES HAVE BEEN PERFORMED.

APPROUVÉ par / Approved by:

Steve Johnson



DATE: 2012-05-11

/ Nous certifions que toute l'information comprise sur ce rapport est exacte et conforme aux requis du client./We certify that all the information on this report is exact and in accordance with the order requirements.

CERTIFICATE OF
CONFORMANCE

CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1

DATE: Jun-12-2012

CONSIGNMENT TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 114970
INVOICE #: 60875

CONTRACT OR
PURCHASE ORDER # PO17084

DESCRIPTION:	CROSSTUBE	QTY	1
P/N #	d350-748-101	S/N #	81517

STRESS RELIEVE HEAT CHART # 12-546. MPI-IAW ASTM-E-1444.
CADMIUM PLATE IAW AMS-QQP-416C TYPE 2 YELLOW CLASS.
BAKE HEAT CHART # 12-573. MPI IAW ASTM-E1444.

80769/10

CERTIFICATE: I certify that the items indicated here on have
been inspected and tested and conform to all specifications
and requirements detailed on the contract or purchase order.

Approved Inspector:

CAI
08



LIQUID PENETRANT TEST REPORT

P- 12188

NT	DATE	PAGE																																					
ENTION	ACUREN JOB NO.	OF																																					
ADDRESS	PO/WO NO.	1																																					
PROJECT	WORK LOCATION	TIME																																					
ITEM(S) EXAMINED	ACCEPTANCE STD	AM <input checked="" type="checkbox"/>	PM <input type="checkbox"/>																																				
<p><i>DAT Aerospace</i> MATT/LINDA 1270 ABERDEEN ST. HAWKESBURY, ONT</p> <p><i>F.P.I. on cross tubes</i> (6) Pcs SEE RESULTS</p>																																							
JOB DESCRIPTION		PROCEDURE NO. LT002 REV./DATE	TECHNIQUE NO. LT Tech 2 REV./DATE																																				
PART NO.	<i>SEE RESULTS</i>																																						
SCOPE	<i>A DRY FLUORESCENT LIQUID PENETRANT WAS COMPLETED 100% ON EXTERNAL SURFACE</i>																																						
TEST DETAILS																																							
METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH																																				
FLUORESCENT	<i>MAGNAFLUX</i>																																						
MINIMUM Dwell TIME	45 ¹⁰	MIN.	BLACK LIGHT S/N 16459 <input checked="" type="checkbox"/> OUTPUT > 1000 μ W/cm ²																																				
MINIMUM DRY TIME	>10	MIN.	LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT																																				
DEVELOPER	SKD 52	MINIMUM Dwell TIME	10 MIN.	OTHER LAB NO. <i>1098866</i>																																			
DEVELOPER TYPE	<input checked="" type="checkbox"/> NON AQUEOUS	<input type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY	LIGHT METER S/N <i>1098866</i>																																			
TEST SURFACE				CAL DUE DATE <i>July 19 2013</i>																																			
SURFACE CONDITION	<input type="checkbox"/> AS GROUND	<input type="checkbox"/> AS WELDED	<input type="checkbox"/> MACHINED	<input checked="" type="checkbox"/> CLEAN BARE METAL																																			
SURFACE TEMPERATURE	<i>< -4°C/ 20°F</i>			<input type="checkbox"/> SHOT BLASTED																																			
RESULTS-	<i>(✓) METRIC</i>			<input type="checkbox"/> 10°C/50°F TO 52°C/125°F																																			
<p><i>W.O. #5 - CROSS TUBES</i></p> <table border="1"> <tr> <td>1 - "</td> <td>83701</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>1 - "</td> <td>83699</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>1 - "</td> <td>83698</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>1 - "</td> <td>81517</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>1 - "</td> <td>81516</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>1 - "</td> <td>84380</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td><i>12.06.19</i></td> </tr> </table>					1 - "	83701	✓			1 - "	83699	✓			1 - "	83698	✓			1 - "	81517	✓			1 - "	81516	✓			1 - "	84380	✓							<i>12.06.19</i>
1 - "	83701	✓																																					
1 - "	83699	✓																																					
1 - "	83698	✓																																					
1 - "	81517	✓																																					
1 - "	81516	✓																																					
1 - "	84380	✓																																					
				<i>12.06.19</i>																																			

Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as to the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, express or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE

Matthew Murdoch *Matthew Murdoch*
 PRINT SIGNATURE

TECHNICIAN (SIGNATURE):

Mike Lethbridge

NAME (PRINT):

CGSB LEVEL SNT LEVEL
 CGSB REG. NO. *10606*

2nd TECHNICIAN
 CGSB LEVEL SNT LEVEL
 CGSB REG. NO.

DTR # *E 63501*

REPORT

REVIEWED BY:

NAME

INIT

CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY